

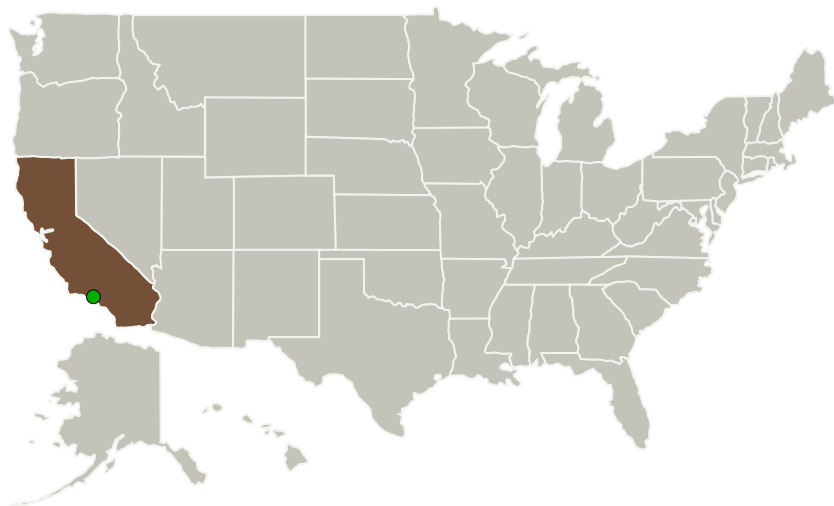
# Miniature, Low Power Gas Chromatograph with Sample Pre-Processing Capability and Enhanced G-Force Survivability for Planetary Missions, Phase I

Completed Technology Project (2010 - 2010)

## Project Introduction

Thorleaf Research, Inc. proposes to develop a miniaturized, low power gas chromatograph (GC) with sample pre-processing capability and enhanced capability for handling high inertial loads in a modular design optimized for integration into flight instrumentation. Our innovative approach employs a miniature sampling valve and loop to provide selective pre-concentration of trace level compounds from the sample stream using adsorbents and/or cryogenic focusing. This leak-tight design minimizes the number of components and tubing connections, thereby reducing instrument volume and mass while enhancing system robustness and improving inertness. We believe it will be possible to develop the miniaturized GC system at a mass of about 1 kg, average power consumption of less than 0.5 watts for isothermal operation, and sample pre-concentration factors of up to 1000x, with capability to withstand a kilo-g. This modular design can be interfaced to miniature mass spectrometers (MS), ion mobility spectrometers (IMS), and other detectors of interest to NASA. The goal of our proposed SBIR Phase 1 effort is to demonstrate feasibility for a miniaturized, low power GC with sample pre-processing capability and enhanced g-force survivability for planetary missions, and to develop a detailed design for fabricating and demonstrating prototype instrumentation in Phase 2.

## Primary U.S. Work Locations and Key Partners



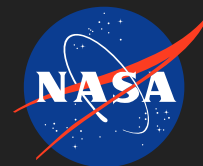
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Organizations Performing Work	Role	Type	Location
Thorleaf Research, Inc.	Lead Organization	Industry	Santa Barbara, California
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

## Primary U.S. Work Locations

California

## Project Transitions

▶ **January 2010:** Project Start

✓ **July 2010:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139235>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Thorleaf Research, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

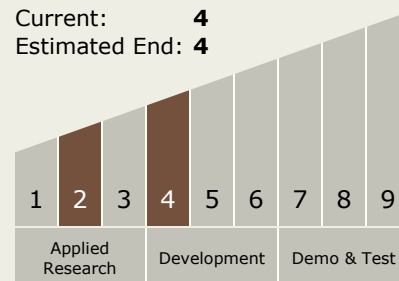
Carlos Torrez

### Principal Investigator:

Paul Holland

## Technology Maturity (TRL)

Start: 2  
Current: 4  
Estimated End: 4



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## Technology Areas

### Primary:

- TX04 Robotic Systems
  - └ TX04.3 Manipulation
    - └ TX04.3.4 Sample Acquisition and Handling

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System